

Modelling heterogeneous interfaces for overall water splitting

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Abstract

Metal oxide nanostructures with hetero-contacts and phase boundaries offer unique platform for designing materials architectures for solar harvesting applications. Besides the size and surface effects, the modulation of electronic behavior due to junction properties leads to modify surface states that promote higher efficiency. The growing possibilities of engineering nanostructures in various compositions (pure, doped, composites, heterostructures) and forms (particles, tubes, wires, films) has intensified the research on the integration of different functional material units in a single architecture to obtain new materials for solar energy harvesting application. In this work we present the deposition and modification of semiconducting metal oxides and their multilayers for photoelectrochemical (PEC) hydrogen production. The deposition parameters for thin film creation were optimized with respect to the PEC performance of the resulting materials in neutral solution. The long-term performances of the metal oxide photoanodes were determined in neutral solution as well.

Keywords - Water Splitting; Solar Hydrogen; Heterostructure; Photoelectrochemical; Semiconductor